FusionLighting

June 17, 1996

Mr. William Caton
Acting Secretary
Office of the Secretary
Federal Communications Commission
1919 M Street, N.W., Room 222
Washington, D.C. 20554

RE: Notice of Proposed Rule Making
ET Docket No. 96-8

Dear Mr. Caton:

Please accept these comments from Fusion Lighting, Inc., in response to the Commission's Notice of Proposed Rule Making in ET Docket No. 96-8. Fusion Lighting may also file additional comments in reply to other comments submitted pertaining to this docket.

Fusion Lighting has developed and is beginning to market (the first product is named Solar 1000™) a revolutionary new visible lighting technology utilizing microwave excitation of sulfur (commonly called electrodeless technology, as the bulb has no electrode). The microwave source for the Solar 1000™ is a magnetron operating in the 2400-2500 MHz ISM band. This frequency band was chosen because it is a designated ISM band, and the low cost, highly efficient magnetron used in millions of microwave ovens is widely available. The Solar 1000™ uses a power supply and magnetron similar to those used in microwave ovens. The Solar 1000™ lamp produces light with near sunlight like spectra without the damaging UV or IR radiation. This lighting system is efficient, using less than 1,500 watts of electricity to produce the same amount of light found in seventy 100 watt light bulbs. Life expectancy is 45,000 hours for the power supply and lamp, and 15,000 hours for the magnetron. Additionally, there is no mercury or other environmentally hazardous material in the bulb, which is not true with other high efficient light sources.

Fusion Lighting's technology grew out of work originally carried out by Fusion Systems Corporation. Fusion Systems manufactures ISM equipment which generates UV light by microwave excitation of mercury. Fusion Systems' domestic and international sales exceed $110 million. The US Department of Energy (DOE), the Environmental Protection Agency (EPA), and NASA have contributed to the funding of the Solar 1000™ technology. The worldwide market for lighting products is over $50 billion.

FUSION LIGHTING, INC.
301-251-0300 ✆ • 7524 Standish Place, Rockville, Maryland 20855 USA • FAX 301-926-7258

The DOE estimates that nearly 20% of energy use in the US is for lighting, and another 4-5% is used for cooling heat generated by lights in buildings. Clearly, higher efficiency light sources are a priority for the United States. Fusion Lighting believes that the efficiency, long life, and other advantages that the Solar 1000™ offers will allow the microwave driven electrodeless lamp to capture significant market share. In success, this will have a positive impact on the US economy, environment, and foreign trade deficit.

Use of the ISM Bands

The ISM bands are spectra reserved primarily for the use of industrial and consumer based process equipment. Development and improvements to ISM equipment should be encouraged for a multitude of reasons, including higher energy efficiency and resource (fossil fuel) conservation. ISM equipment is now used to process billions of dollars worth of materials and goods in the US each year. In addition to the newly developed microwave sulfur lamp, there has been recent work in medical devices operating in ISM bands that treat prostrate conditions, and equipment that sterilizes medical equipment that could not be sterilized by other means.

As these and other new technologies are developed, the emission characteristics of ISM equipment could change vastly from those found in today's microwave ovens. Today's microwave ovens emit signals on half of a line cycle, 60 Hz pulses. Many of the new ISM devices emit continuous or DC emissions. The emission characteristics in the microwave ovens themselves could also significantly change, with the advent of low cost and reliable switching power supplies, a low cost klystron microwave source, a solid-state microwave source, and other developments that could generate a true DC or constant signal.

Fusion Lighting urges the Commission to consider recent and potential future changes in ISM equipment when it makes rulings on secondary users within the ISM bands. Fusion Lighting urges the Commission not to eliminate the current limit on directional gain antennas for spread spectrum systems in the 915 MHz band. Fusion Lighting supports the Commission's decision to deny a reduction of minimum channels from 75 to 20 for frequency hopping, spread spectrum systems, in the 2450 and 5800 MHz bands. Further, Fusion Lighting urges the Commission to caution manufacturers and users of secondary equipment in the ISM bands as to the rules themselves and the potential for interference with both current and future ISM devices.

It is not possible for the Commission or secondary users of the ISM band to fully anticipate future interference potentials. Once an unlicensed technology moves into an ISM band, there can be no assurance that it will be compatible with future ISM equipment. We fear a situation in which outside pressure is applied to the lawfully correct primary use ISM device, limiting its use or effectiveness, and making the unlicensed user the primary user in the band. This situation is already beginning to emerge. Manufacturers of the unlicensed secondary equipment are telling their users to turn off legally operating primary ISM equipment if there is interference, even though the unlicensed equipment is not the primary user. For example, see the troubleshooting guide (P28) in the owner's manual for RF-Link's Wavecom & Wavecom Jr. (attached). This implies that the unlicensed secondary user has primary spectrum rights. This is not true. This has happened before with garage door openers and wireless home security systems where unlicensed secondary users effectively became the primary users.

In choosing the 2400-2500 MHz ISM band for its ISM based sulfur lamp, a band in which 80-100 million US microwave ovens presently operate, Fusion Lighting sought to eliminate the chance of interference with properly licensed radio communications. As new and widely beneficial ISM equipment is being developed, and should continue to be developed, the chance for interference with unlicensed secondary communication users is likely to occur, especially as these new ISM equipment emission characteristics change from that of today's equipment. The Commission should not encourage, but discourage unlicensed secondary communication users in the ISM bands. It is the view of Fusion Lighting that the Commission should not allow unlicensed communication technology under part 15 as being proposed by this docket. At a minimum, the Commission should adopt immunity standards for all unlicensed secondary users for both present pulsed microwave oven emissions as well as the emerging DC (or constant on) type signals.

Sincerely,

Wayne Love

Wayne Love
Senior Engineer

WL:cmc
Attachment

RF-Link™

RF-Link Systems, Inc.
8th Floor, No. 19, Section 3
Nanking East Road
Taipei, Taiwan, R.O.C.
886-2-516-5936
886-2-504-6508 Fax

RF-Link Technology, Inc.
411 Amapola Avenue
Torrance, CA 90501
USA
310-787-2328
310-787-2323 Fax

RF-Link Systems, Inc.
1F, No.9, Chan Yen Road I
Science-Based Industrial Park
Hsinchu, Taiwan, R.O.C.
886-35-799-999
886-35-776-699 Fax

RF-Link™

OWNER'S MANUAL

for

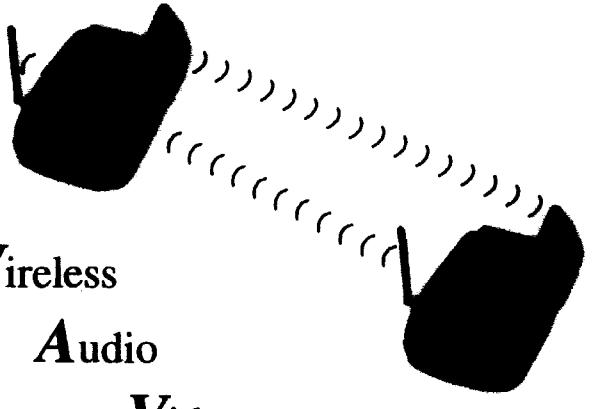
WAVECOM™

(Models Tx 888R and Rx 999R)

and

WAVECOM™ Jr.

(Models Tx 888 and Rx 999)



Wireless

Audio

Video

Everywhere

COMmunicator

To the User of WAVECOM™

Important Safety Precautions

- To prevent fire or shock hazard, do not expose this product to rain or moisture. Do not use near a bath tub, wash bowl, sink, or laundry tub; do not use in a wet basement or in or around a swimming pool.
- To avoid electrical shock, do not open the case of this product.
- Operate this product using only the power supply included with it or provided as an accessory.
- Do not overload electrical outlets or extension cords as this can result in fire or electric shock.
- Refer servicing to qualified personnel only.

Caution: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Made in Taiwan, R.O.C.

Contents

Troubleshooting

Please read this owner's manual carefully and follow the steps described in it. If you still have difficulties, consult the following table. It will guide you through the most common problems and their solutions.

Problem	Possible Remedies
No picture or sound	• Check the power on/off switches on the transmitter and receiver • Check power switches on the remote TV and video source (VCR, laser disc player, satellite receiver, etc.) • Make sure power plugs are pushed all the way in • Check all cable connections
Interference: Noisy picture or audio	• Adjust receiver antenna orientation (see section on "Orienting Units for Optimal Performance" in this manual) • Adjust transmitter antenna orientation (see section on "Orienting Units for Optimal Performance" in this manual) • Select a different channel by pushing the channel selector button on both transmitter and receiver so that the channels match • If using a microwave oven, turn it off • Remove microwave oven from path between transmitter and receiver.
Remote control extender does not work (WAVECOM™ only)	• Check the path between the transmitter and the audio/video source and clear any obstructions. • Check to see if the IR window on the bottom front of the WAVECOM™ transmitter is blocked • Make sure IR deflector is properly oriented below the component you wish to control (see section on "Using the Remote Control Feature" in this manual) • Adjust remote control antennas (see section on "Orienting Units for Optimal Performance" in this manual)

Care and Maintenance

Clean the outside plastic packaging with a soft cloth lightly moistened with mild soap and water. Never use any abrasive scouring powder or solvent.

Future Enhancements

Future versions of WAVECOM™ and WAVECOM™ Jr. will have these improvements:

- The ability to turn their power on and off remotely.
- The ability to change channels on the transmitter and receiver simultaneously.
- An additional port on the receiver unit to accommodate a computer mouse so the user can remotely control the source computer.

Specifications

Transmitter:	
Output Level	90 dB microvolts/meter at 3 meters
Operating Frequency Band	2.4 to 2.4835 GHz
Modulation	FM (video and audio)
Video Input Level	1V p-p
Audio Input Level	1V p-p
Video Input Impedance	75 ohms
Audio Input Impedance	600 ohms
Power Supply	12 Vdc, 350 mA
Dimensions	6.9 x 4.4 x 1.8 inches
Weight	13 ounces
Receiver:	
Output Level	1 volt p-p (video), 1 volt p-p (audio)
Noise Figure	3.5 dB
Power Supply	12 Vdc, 350 mA
Remote Control Transmitter Frequency	422 MHz *
Dimensions	6.9 x 4.4 x 1.8 inches
Weight	15 ounces

* For Model Rx 999R only (not included in WAVECOM™ Jr.)

All specifications are subject to change without notice.

Warranty Information

RF-Link Technology, Inc., referred to as "RF-Link" hereafter, warrants this product against any defects in material or workmanship for a period of 90 days from the date of original purchase. This Limited Warranty shall not apply if the product has been damaged due to abuse, misuse, misapplication, accident, or as a result of service or modification not approved by RF-Link. Should the product become defective within the warranty period, RF-Link will repair or replace the product at our option, provided that it is shipped prepaid to RF-Link.

There are no express warranties other than those described above. No warranties whether expressed or implied, including but not limited to, any implied warranties of merchantability or fitness for a particular purpose, shall extend beyond the time period listed above. Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you. This warranty gives you specific legal rights; you may also have other rights which vary from state to state.